Fig. 1

Fig. 2

AVS ⌐   CA ⌐   FE ⌐

Content Analysis ⟹ | Feature Extraction |

HD ⌐   ⌐ MEM

| 10 | RUR Mapping Transformation Circuit |

| 18 | Ambient Lighting Production Circuit |

| Ambient Lighting Space Lookup Table |

LUT ⌐

U2 ⌐ | User Interface & Preferences Memory |

| D88 | Lamp Interface Drivers |

88 ⌐

Light ID = 1 ...   Ambient Light Sources   ... N

Fig. 3

$$R_{avg} = \frac{\sum\limits_{i=1}^{n,m}\;\sum\limits_{j=1} R_{ij}}{n \times m}$$

Fig. 4

– Prior Art –

$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix} = \begin{bmatrix} X_{r,max} & X_{g,max} & X_{b,max} \\ Y_{r,max} & Y_{g,max} & Y_{b,max} \\ Z_{r,max} & Z_{g,max} & Z_{b,max} \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

M ⌐

Fig. 5

$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix} = M_1 \cdot \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

Video Display D

Fig. 6

$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix} = M_2 \cdot \begin{bmatrix} R' \\ G' \\ B' \end{bmatrix}$$

Ambient Light Sources 88

Fig. 7

$$\begin{bmatrix} R' \\ G' \\ B' \end{bmatrix} = M_2^{-1} \cdot M_1 \cdot \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

Fig. 8

– Prior Art –

$$M = \begin{bmatrix} s_r X_r & s_g X_g & s_b X_b \\ s_r Y_r & s_g Y_g & s_b Y_b \\ s_r Z_r & s_g Z_g & s_b Z_b \end{bmatrix}$$

Fig. 9

$$\begin{bmatrix} s_r \\ s_g \\ s_b \end{bmatrix} = \begin{bmatrix} X_w \\ Y_w \\ Z_w \end{bmatrix} \begin{bmatrix} X_r & X_g & X_b \\ Y_r & Y_g & Y_b \\ Z_r & Z_g & Z_b \end{bmatrix}^{-1}$$
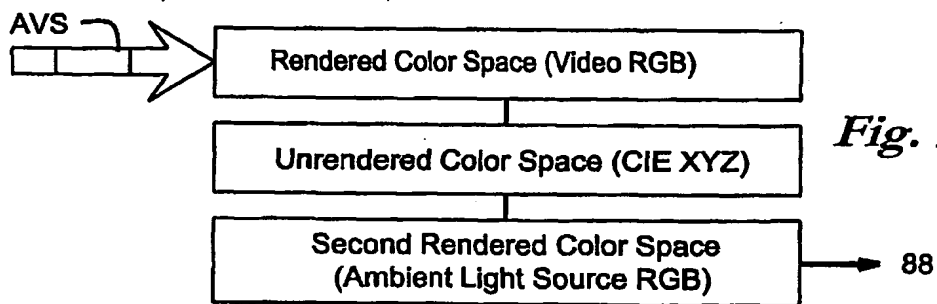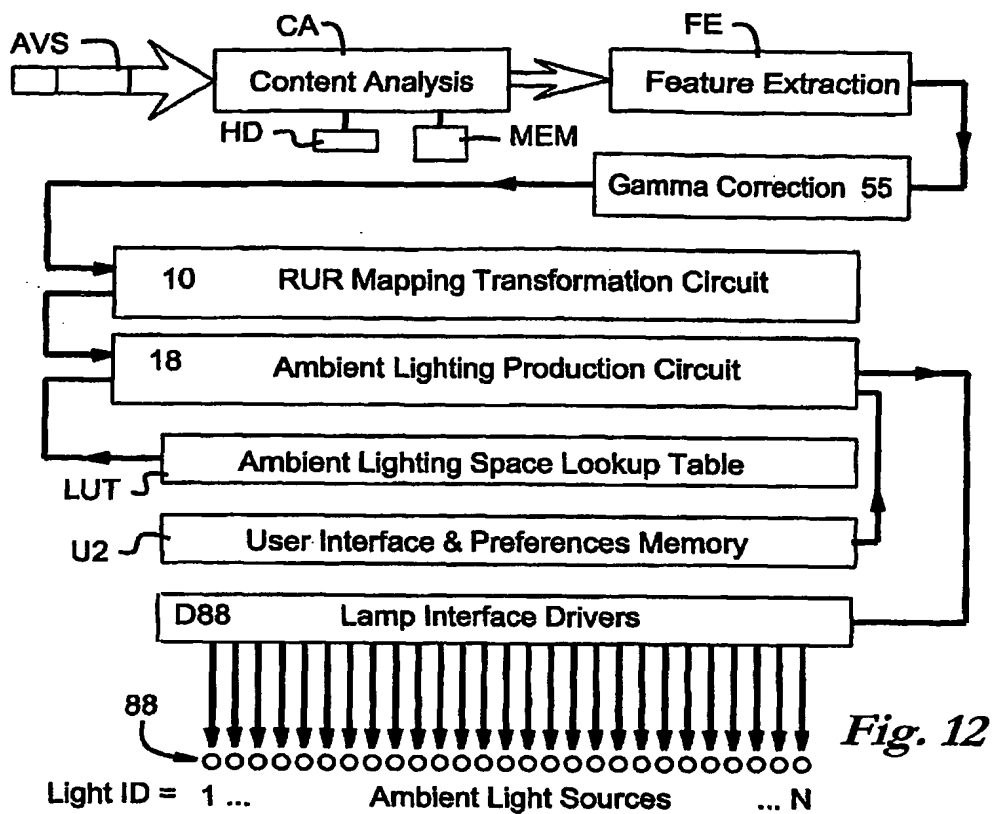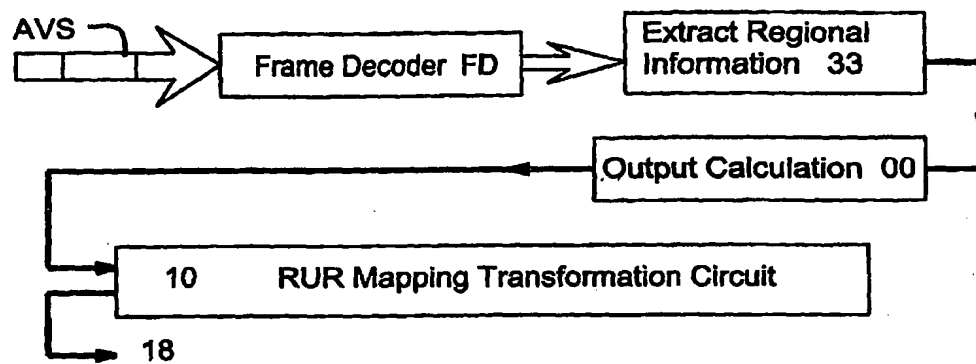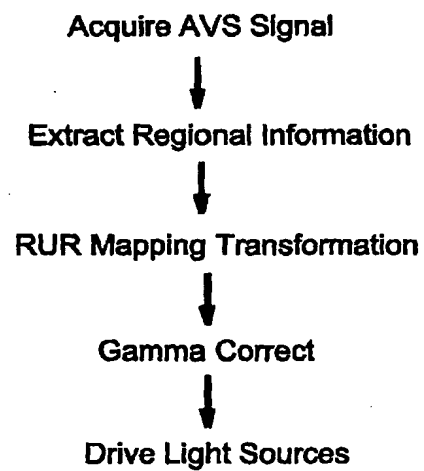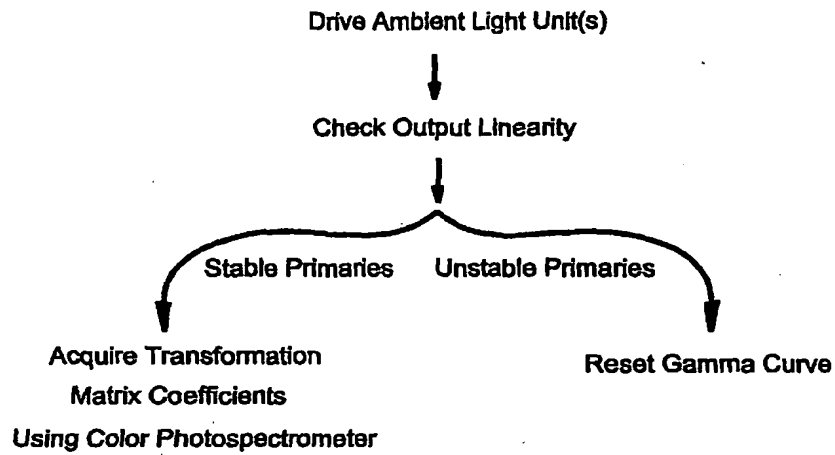
-- Prior Art --

Fig. 10

$$\begin{bmatrix} s_r \\ s_g \\ s_b \end{bmatrix} \begin{bmatrix} X_r & X_g & X_b \\ Y_r & Y_g & Y_b \\ Z_r & Z_g & Z_b \end{bmatrix} = \begin{bmatrix} X_w \\ Y_w \\ Z_w \end{bmatrix}$$

– Prior Art –

Fig. 11

AVS

CA ‑

Content Analysis

HD ‑⌐   ⌐‑ MEM

FE ‑

Feature Extraction

Gamma Correction 55

10   RUR Mapping Transformation Circuit

18   Ambient Lighting Production Circuit

Ambient Lighting Space Lookup Table

LUT ∫

User Interface & Preferences Memory

U2 ∫

D88   Lamp Interface Drivers

88

Light ID = 1 ...   Ambient Light Sources   ... N

Fig. 12

AVS ‑

Rendered Color Space (Video RGB)

Unrendered Color Space (CIE XYZ)

Fig. 13

Second Rendered Color Space
(Ambient Light Source RGB)   → 88

AVS → Frame Decoder FD → Extract Regional Information 33

Output Calculation OO

10   RUR Mapping Transformation Circuit

18

Fig. 14

Acquire AVS Signal

↓

Extract Regional Information

↓

RUR Mapping Transformation

↓

Gamma Correct

↓

Drive Light Sources

Fig. 15

Drive Ambient Light Unit(s)

↓

Check Output Linearity

↓

Stable Primaries   Unstable Primaries

Acquire Transformation   Reset Gamma Curve
Matrix Coefficients
Using Color Photospectrometer

Fig. 16

Prepare Colorimetric Estimate of Video Reproduction
(From Rendered Color Space, e.g., Video RGB)

↓

Transform Unrendered Color Space

↓

Transform Colorimetric Estimate for Ambient Reproduction
(Second Rendered Color Space, e.g., LED RGB)

Fig. 17